Factors Affecting the Magnitude of Poor Families Across the Philippines: A Cross Section Data Analysis

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2011

FACTORS AFFECTING MAGNITUDE OF POOR FAMILIES ACROSS THE PHILIPPINES: A CROSS SECTION DATA ANALYSIS

By

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Abstract

This study is conducted to determine the factors affecting magnitude of poor families in the Philippines and measure the effect of the variables presented. The model was estimated using the Ordinary Least Square (OLS) procedure and cross sectional data set consisting of the 16 regions in the Philippines in the year 2000. The four variables that are found to have significant coefficients are gross regional domestic product (GRDP), functional literacy rate of the population 10-64 years old, number of persons with disabilities, and percentage of household with at least one land owned. Specifically, a peso increase in GRDP decreases the magnitude of poor families by 1 family. When the functional literacy rate increases by one percent decreases the number of poor families by 10,426 families. A unit increase in the number of persons with disability increases the number of poor families by around 4 families. While a percentage increase in the number of family with access to land by at least one land decreases the magnitude of poor families by 5,633 families. Result of the estimation shows that 81% of the variability of the magnitude of poor families in the Philippines can be explained by the predictors of the Model.

Introduction

Philippines is among the developing nations of the world, thus, poverty is inevitable. The Asian Development Bank (ADB) defined poverty as deprivation of essential assets and opportunities to which every human is entitled. Everyone should have access to basic education and primary health services. Poor households have the right to sustain themselves by their labor and be reasonably rewarded, as well as have some protection from external shocks. Beyond income and basic services, individuals and societies are also poor— and tend to remain so—if they are not empowered to participate in making the decisions that shape their lives. Several policy, plans,

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participatory programs and livelihood was implemented in the country to reduce poverty. The most of common among others are the Medium Term Philippine Development Plan (MTPDP) prepared every 6 years to coincide with the term of the President, sets out that administration's development goals. The Plan also lays out the framework for poverty reduction efforts. Other poverty programs like Tulong sa Tao, Social reform Agenda, Lingap para sa mahihirap, and Kapit bisig laban sa kahirapan (KALAHI) was implemented yet poverty in the country have worsen.

Table 1 presents data on the number of poor families, illustrating that the overall increase in the number of poor was most pronounced during the periods 1988–1991 (550,000 additional poor families) and 1997–2000 (629,000 additional poor families).

Table 1. Changes in Poverty Incidence and in the Number of Poor Families, 1985-2000

Period	Philippines		Rural		Urban	
	Change in Poverty Incidence (%)	Change in Number of Poor Families	Change in Poverty Incidence (%)	Change in Number of Poor Families	Change in Poverty Incidence (%)	Change in Number of Poor Families
1985–1988	-4.0	-124,000	-4.4	-73,000	-3.5	-51,000
1988–1991	-0.3	550,000	2.3	-99,000	1.0	649,000
1991–1994	-4.4	-250,000	-1.6	76,000	-7.1	-326,000
1994–1997	-3.7	-20,000	-2.6	294,000	-6.1	-314,000
1997–2000	1.9	629,000	2.5	343,000	2.0	286,000
1985–2000	**-10.5**	**785,000**	**-3.8**	**541,000**	**-13.7**	**244,000**

Source: NSO data [M92].

Table 1 also shows changes in urban and rural poverty incidence and the absolute numbers of urban and rural poor families. Trends have differed substantially. From 1988 to 1991, there appears to have been a moderate reduction in the number of rural poor families, with a massive increase in the number of urban poor families. From 1994 to 1997 the large increase in rural poor families was almost commensurate with the large decrease in urban poor families.

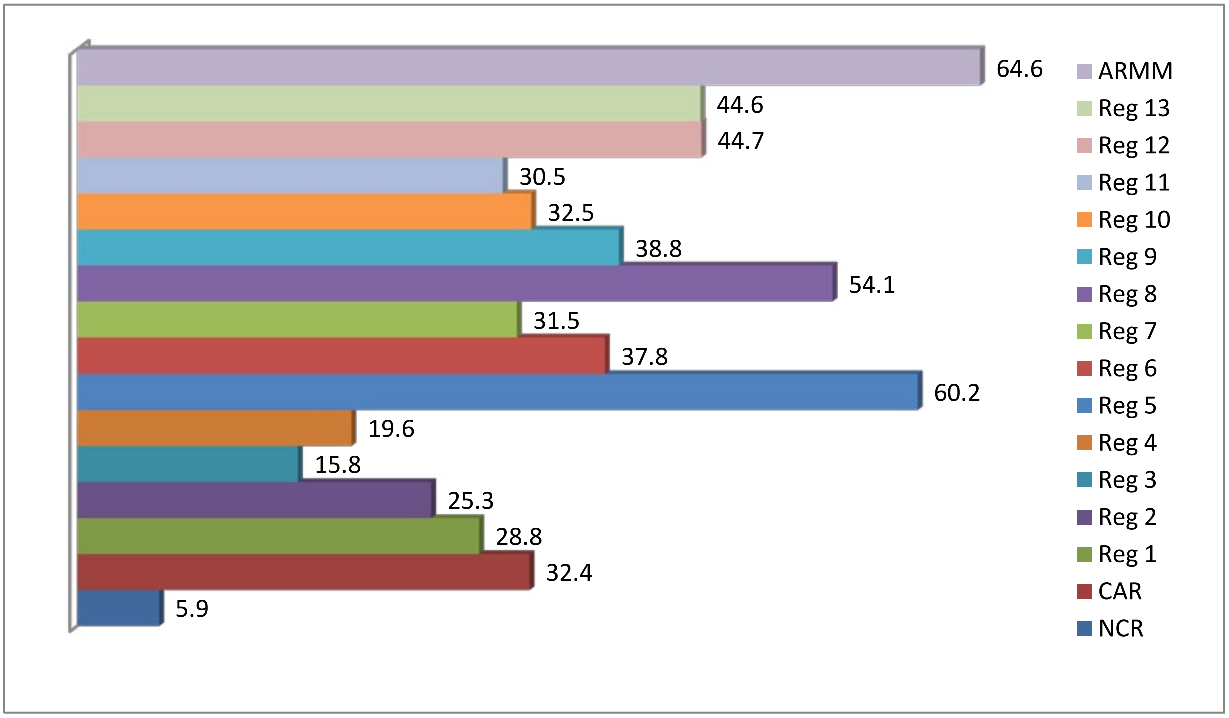

Figure 1: Percentage of poor families per region, 2000

The percentage of poor families per region in 2000 is presented in Figure 1. Its shows that among the 16 regions in the Philippines, The Autonomous Region Muslim in Mindanao (ARMM) has the most number of poor families relative to its total number of household with 64.6 percent. It is a common knowledge that poverty in ARMM is highly related to unstable peace and order situation and corruption. This is followed by Region 5, and Region 8 in which more than 50% of the total household are below the poverty threshold with 60.2% and 54.1 respectively. These is very alarming because it reflects the general health of the labor force of the nation, thus several studies suggested that poverty could lead to more severe social problems and affects the capacity of the people to participate in achieving economic goals and declining it potential to contribute to the general development of the nation. This study would like to contribute to poverty literature in the country using cross sectional data set for 2000 that could be helpful as policy inputs for poverty reduction.

Objective of the Study

The general objective of the study is to explore the various factors and it's effect to the magnitude of poor families in the Philippines in 2000.

Review of Related Literatures

Several studies were conducted to determine the factors that might affect the magnitude of poor families around the world, especially in developing nations. This part of the study will review some relevant studies on the variables presented in the study and its relationship to poverty.

Literacy was generally belief that it leads to positive economic outcome. In the study conducted by Yadav, R in 2008 shows indications that literacy levels significantly contributed in reducing poverty. Ravallion and Datt (2002) in a study of growth and poverty in India find that initial inequality in interaction with literacy, farm productivity and asset distribution affects the relationship between growth and poverty. Bigsten et al. (2003) using panel data find land ownership, education, type of crops, dependency and location to be important determinants of poverty in Ethiopia. The poverty studies in Malawi also show that the main determinants of poverty are education, occupation, per capita land, type of crops, diversification out of maize and tobacco, participation in public works programs and paid employment opportunities (Mukherjee and Benson, 2003).

Disability has often been associated with poverty (Yeo and Moore 2003, Hoogeveen 2005, Elwan 1999). Disability is the outcome of the interaction of a person's functional status and their environment. People are not identified as having a disability based upon a medical condition, but rather are classified according to a detailed description of their functioning, along various domains ranging from specific body functions to basic activities (e.g., walking and seeing) to the extent of their participation in work, school, family life, and other endeavors (World Bank and UN, 2007). The combination of poverty and disability is a fearsome one. Either one may cause the other, and their presence in combination has a tremendous capacity to destroy the lives of people with impairments and to impose on their families burdens that are too crushing to bear (Acton, N., 1983). Poverty and disability seem to be inextricably linked. It is often noted that disabled people are poorer, as a group, than the general population, and that people living in poverty are more likely than others to be disabled. Well-being is associated with the ability to work and fulfill various roles in society (Brock, 1999).

Conceptual Framework

Figure 2 shows the conceptual framework of the linear model used in this study. These independent variables will be tested to determine its impact to the dependent variable.

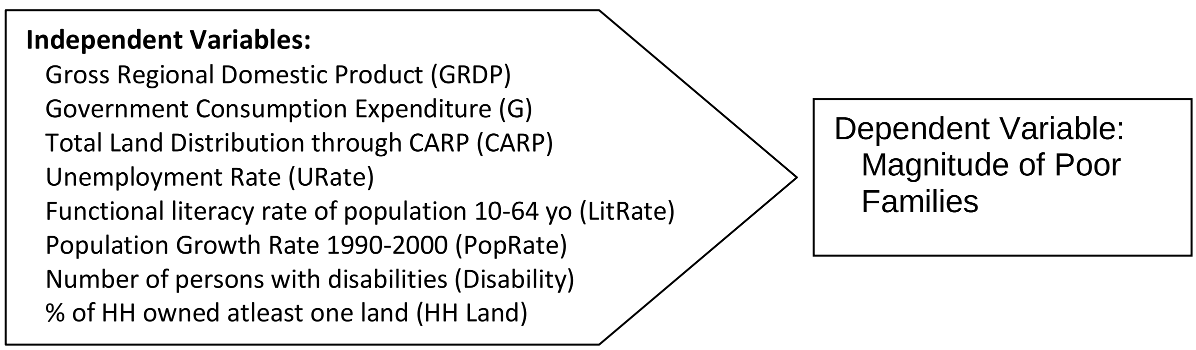

Figure 2. Factors affecting the magnitude of poor families in the Philippines.

Data Collection

The study employed secondary data taken from the National Statistical Coordination Board (NSCB)- 2000 Philippine Statistical Yearbook. The study used cross sectional data set for 16 regions in the Philippines. This is due to several issues on the changes in poverty estimates methodology in 1985, 1992 and 2003 which affect the time series data set of the variable. The study was conducted for 2000 due to the availability of data.

Model Specification

To study the effect of various factors on the magnitude of poor families, Model 1 below is estimated using the OLS procedure and a cross sectional data set consisting of sixteen regions in the Philippines in the year 2000.

Model 1:

$$Y_i = f(GRDP_i, G_i, CARP_i, URate_i, PopRate_i, LitRate_i, Disability_i, HHLand_i) + \varepsilon_i$$

The Dependent variable is the magnitude of poor families of each region. The i subscript denotes to regions and ε is the error term. The definition and expected signs of each individual independent variable used in Model 1 is given in Table 2.

Table 2. Independent variables included in Model 1 with their definitions and expected signs of their coefficients.

Independent Variable	Definition	Expected Sign of Coefficients
GRDP	Gross Regional Domestic Product, In Million at constant 1985 prices	Negative
G	Government Consumption Expenditure In Million pesos at constant 1985 prices	Negative
CARP	Total land distribution per province through CARP in hectares from 1987-2002	Negative
URate	Proportion in % of the total number of unemployed person to the total number of persons in the labor force	Negative
PopRate	Population Growth rate from 1990-2000	Ambiguous
LitRate	Functional Literacy Rate of the population 10-64 years old.	Negative
Disability	Number of persons with disabilities	Positive
HHLand	Percentage of the total household with atleast one land owned	Negative

Data Analysis

Table 2 summarizes the main statistics on each variable included in Model 1. The National Capital Region (NCR) has the highest GRDP, Unemployment rate and Functional Literacy rate while the Autonomous Region Muslim in Mindanao (ARMM) has the lowest in the three variables. In terms of government consumption expenditure (G) NCR has the highest while Cordillera Autonomous Region (CAR) has the lowest. Around 55 percent of the families in CAR owned at least one land while NCR has the lowest with around 17 percent. The standard deviations of all variables presented in the Model were quite large, which reflects disparity in several variables across regions in the Philippines in 2000.

Table 2. Statistic of variables included in equation 1.

Variable	Maximum	Minimum	Mean	Standard Deviation
GRDP*	297,065 (NCR)	9,200 (ARMM)	60,821	72,282
G*	30,850 (NCR)	1,526 (CAR)	4,465.9	7,105
CARP	619,336 (Reg. 4)	0.0000 (NCR)	366,870	175,020
URate	17.800 (NCR)	4.1 (ARMM)	8.7125	3.0371
PopRate	3.62 (Reg. 4)	1.42 (Reg. 6)	2.2037	0.54347
LitRate	92.4 (NCR)	61.2 (ARMM)	81.225	7.0030
Disability	144,290 (Reg. 4)	12,989 (ARMM)	58,868	37,007
HHLand	55.45 (CAR)	16.71 (NCR)	36.374	11.382

* In Million Pesos

Test for Multicollinearity

There are two different types of multicollinearity. These two types are perfect multicollinearity and imperfect multicollinearity. Perfect multicollinearity is when an independent variable has a perfect linear relationship with one or more other independent variables. This violates Classic Assumption VI which states that no independent variable can have a linear relationship with one or more other independent variables. The other type of multicollinearity is imperfect multicollinearity which is when two independent variables are highly correlated but they do not have a perfect linear relationship.

Under the multicollinearity problem, the estimates will still be unbiased as long as the other classical assumptions are not violated. A major problem under multicollinearity is that the standard errors of the estimates will increase. This ultimately causes the t-statistics to become very small which will make it hard to find the coefficients on thses variables significant. Under multicollinearity the coefficients on uncorrelated independent variables will remain unaffected. Table 4 shows the correlation coefficients for each pair of variables used in this study. The rule of thumb is that a correlation coefficient higher than .8 is considered too high.

As Table 3 indicates, there are correlations among the variables used in the study. There are correlation between GRDP and G with 0.92, between GRDP and URate with 0.91, between G and URate with 0.84 and between Disability and % HH Land with 0.84. This may cause a problem with multicollinearity between these variables.

Table 3. Correlation Coefficients of Independent Variables and Dependent Variable

Variable	PoorFam	GRDP	**G**	CARP	URate	PopRate	LitRate	Disability	% HH Land
PoorFam	1.00000								
GRDP	-0.00650	1.00000							
G	-0.20702	**0.92080**	1.00000						
CARP	0.36987	-0.30180	-0.49653	1.00000					
URate	0.06719	**0.91220**	**0.84860**	-0.30940	1.00000				
PopRate	0.19278	0.32221	0.06624	0.28889	0.14735	1.00000			
LitRate	0.01251	0.59616	0.49421	0.11725	0.65952	-0.05287	1.00000		
Disability	0.57685	0.72119	0.47792	0.11891	0.72783	0.35207	0.63648	1.00000	
% HH Land	-0.50398	-0.72371	-0.56143	0.02585	-0.75515	-0.22837	-0.59552	**-0.84066**	1.00000

Bold- are highly correlated variables

There are several remedies for multicollinearity, one of the remedy is to drop variables that are causing the problem (Danao, R, 2002). Thus, Government consumption expenditure (G) and Unemployment rate was dropped from the model as shown in Model 2.

Model 2:

$$Y_i = f(GRDP_i, CARP_i, PopRate_i, LitRate_i, Disability_i, HHLand_i) + \varepsilon_i$$

Heteroskedasticity

Heteroskedasticity is a problem that occurs mostly in cross-sectional data sets such as the one used in this study. Normally a model is supposed to be homoskedastic which means that the residuals have the same variance. Heteroskedasticity occurs when the residuals of the estimated model do not have constant variance across various observations. When heteroskedasticity occurs it does not affect the expected value of the coefficients of a model but OLS underestimates the standard errors of the estimated coefficients. This affects the results of the t-tests for significance.

Table 4. Result of the heteroskedasticity test for Model 1 and 2

Regressand	CHI-SQUARE STATISTIC	D.F.	P-VALUE
Model 1			
E**2 ON YHAT:	2.481	1	0.11526
E**2 ON YHAT**2:	2.363	1	0.12426
E**2 ON LOG(YHAT**2):	1.88	1	0.1703
Model 2			
E**2 ON YHAT:	2.568	1	0.10903
E**2 ON YHAT**2:	2.270	1	0.13193
E**2 ON LOG(YHAT**2):	2.330	1	0.12689

A null hypothesis is set up to state that there is homoskedasticity (no heteroskedasticity) and an alternative hypothesis states that there is heteroskedasticity. When running the heteroskesdacity in shazam version 9, the estimated chi-square statistics are below the chi-square critical value at 5% level of significance at 1 degrees of freedom which is 3.84. This means that the null hypothesis must be accepted and that there is no heteroskedasticity in both Model 1 and Model 2 as shown in Table 4.

Autocorrelation

Serial correlation is rare in cross section data set, it occurs frequently in time series because an event in one period can influence events in subsequent periods. The error terms ε_t are said to be serially correlated (autocorrelated) if and only if the assumption thet $E[\varepsilon_s\varepsilon_t]=0$ does not hold. The Durbin-Watson test statistic is designed for detecting errors that follow a first-order autoregressive process. The estimation for Model 1 uses 16 observations and there are 8 estimated coefficients, while Model 2 uses 16 observations and 6 estimated coefficients.

Table 5. Test for serial correlation using durbin Watson test for Model 1 and 2

DW test	Value
Model 1	
Durbin-Watson Statistic	1.83731
Positive Autocorrelation Test P-Value	0.169333
Negative Autocorrelation Test P-Value	0.830667
Model 2	
Durbin-Watson Statistic	2.02556
Positive Autocorrelation Test P-Value	0.280343
Negative Autocorrelation Test P-Value	0.719657

The result of the Durbin Watson (DW) statistic is 1.83731 which is within the upper and lower critical values of both 5% and 1% level of significance with 0.304 to 2.860 and 0.200 to 2.681 respectively. Therefore there is no autocorrelation in Model 1. This result is supported by the p value estimates which are higher than the 0.05 level of significance then there is evidence to reject the null hypothesis of no autocorrelation in both Model 1 and 2 as shown in Table 5.

Results and Discussions

The estimation results of Model 1 and 2 are presented in Table 6. Both Models shows the same sign of coefficients. However, result for Model 2 shows lower standard errors and higher R^2 adjusted compared to Model 1. Over 77% of the variability of magnitude of poor families can be explained by the predictors in Model 1, while around 81% can be explained by the predictors in Model 2. Thus for this paper, model 2 was interpreted and used as the final model to describe factors affecting the magnitude of poor families in the Philippines in the year 2000.

Among the variables included in the model, GRDP, literacy rate, number of persons with disability and the percentage of household owned at least one land turns out significant predictors to the magnitude of poor families, while the number of land distributed through CARP, and population growth rate from 1990-2000 turns out insignificant.

Table 6. Estimation results of Model 1 and 2.

Variables	Model 1	Model 2
Intercept	1096300 (399330)	121350 (326320)
GRDP	-2.3 ns (1.5771)	-1.2531* (0.46664)
G	8.4 ns (11.75)	
CARP	0.1 ns (0.1448)	0.11399 ns (0.12992)
URate	314.5 ns (15655)	
PopRate	-7399.9 ns (57234)	-33546 ns (39849)
LitRate	- 9770.9* (4174.3)	-10426* (3629.1)
Disability	4.2* (1.1785)	3.7004* (0.88076)
% HH Land	-5610.2 ns (2860.5)	-5633.4* (2567.8)
R^2	89.13%	88.34%
R^2 Adjusted	76.72%	80.57%

* significance at $p<0.05$ ns not significant at $p<0.05$
Below the coefficients are standard errors of the estimates

Result of the study revealed that the level of gross regional domestic product has negative effect to the number of families that falls below the poverty line. A peso increase in GRDP pull up 1 family below the poverty line. This is as expected because real GRDP reflects the real income of the region. Functional literacy rate of population 10-64 years old, shows negative relationship to the magnitude of poor families, a unit increase in the level of functional literacy decreases the magnitude of poor families by 10,426 families. These is quite consistent since functional literacy as defined by the National Statistics office (NSO) as a higher level of literacy which includes not only reading and writing skills but also numerical and comprehension skills. In other words, one that is limited only to the basic knowledge of reading, writing and arithmetic that are necessary to manage daily living and employment. Thus, literacy gives member of the household a wide economic and employment opportunities decreasing the tendency of the household to fall below the poverty threshold. The number of persons with disability has positive effect on the magnitude of poor families in the Philippines in 2000. The relationship is quite obvious since people with disability have less economic opportunities and lesser chances to contribute to the improvement of their household economic condition. Moreover, disability reflects extra cost for the household. The percentage of household with at least one land owned shows a negative coefficient. A unit increase in the percentage of household with at least one land owned decreases the number of household that fall below the poverty threshold by 5,633 families. Land is one of the basic asset of every household were they can used to produce foods for home consumption and goods for trade. Thus, access to land of every family is important to reduce the number of poor families in the Philippines.

Conclusion

Result of the study reveals that the magnitude of poor families in the Philippines in 2000 was negatively affected by the level of gross regional domestic product, functional literacy rate of the population 10-64 years old, and percentage of household with at least one land owned. Number of persons with disabilities shows positive relationship to the magnitude of poor families.

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Annex A. Cross Sectional data set used in the study, 2000.

Region	Magnitude of poor families	GRDP*	GE*	CARP	URate	PopRate	Lit	Disability	% HH Land	HH	% of poor household	Land	SevPoverty
NCR	125220	297065	30850	0	17.8	2.25	92.4	109098	16.71	2132989	5.87	356457	0.3
CAR	85426	24730	1526	156491	7.2	1.76	78.6	17321	55.45	263851	32.38	146317	4.4
Reg 1	239263	29737	2818	245033	8.8	1.69	86.4	52715	35.39	831594	28.77	294320	3.3
Reg 2	140508	22619	2221	527611	5.4	1.86	86.6	36195	49.54	554491	25.34	274685	2.2
Reg 3	257817	87227	4568	472084	9.9	2.62	87.3	86770	23.07	1632047	15.80	376508	1.3
Reg 4	473710	148608	4695	619336	11.3	3.62	88	144289	23.62	2413043	19.63	570030	2.4
Reg 5	537703	27117	3000	362492	8.4	1.83	82.6	75772	27.97	893833	60.16	250041	6.8
Reg 6	457829	68641	4117	458949	9	1.42	80.9	87800	23.77	1211804	37.78	287995	4.5
Reg 7	356826	68715	2950	228037	10.4	2.19	80.9	84707	29.75	1133767	31.47	337292	4.5
Reg 8	278486	22746	2771	491980	7.8	1.86	79.7	62924	48.15	515070	54.07	247990	4.2
Reg 9	231078	27064	2087	373988	7	2.31	75.4	31424	41.26	595831	38.78	245831	5.9
Reg 10	176210	37481	2130	465616	6.2	2.26	83.4	29774	36.80	542071	32.51	199485	4
Reg 11	324831	61864	2416	431236	8.8	2.62	79.4	57462	35.98	1066199	30.47	383658	3.9
Reg 12	224226	25762	2096	606506	8.6	2.48	77.4	22165	43.57	501870	44.68	218687	6.6
Reg 13	175480	14566	1575	261914	8.7	1.73	79.4	30482	41.96	393362	44.61	165073	5.8
ARMM	254168	9200	1634	168574	4.1	2.76	61.2	12989	49.00	393269	64.63	192705	7.1

*In Million Pesos

Annex B. Shazam Output

```
|_*This is my ARA
 |_read (d:Poverty2.sha)Y GRDP G CARP URATE POPRATE LITRATE DIS HHLAND/skiplines=1
 UNIT 88 IS NOW ASSIGNED TO: d:Poverty2.sha

 ...SAMPLE RANGE IS NOW SET TO:         1        16
 |_sample 1 16
 |_set wide
 |_stat Y GRDP G CARP URATE POPRATE LITRATE DIS HHLAND/pcor
 NAME        N   MEAN        ST. DEV      VARIANCE     MINIMUM      MAXIMUM  COEF.OF.VARIATION
CONSTANT-DIGITS
 Y            16  0.27117E+06 0.13000E+06 0.16901E+11   85426.      0.53770E+06  0.47942
 GRDP         16   60821.      72282.     0.52247E+10   9200.0      0.29707E+06   1.1884
 G            16   4465.9      7105.6     0.50489E+08   1526.0       30850.       1.5911
 CARP         16  0.36687E+06 0.17502E+06 0.30632E+11   0.0000      0.61934E+06  0.47707
 URATE        16   8.7125      3.0371      9.2238       4.1000       17.800      0.34859
 POPRATE      16   2.2037     0.54347     0.29536       1.4200       3.6200      0.24661
 LITRATE      16   81.225      7.0030      49.042       61.200       92.400      0.86217E-01
 DIS          16   58868.      37007.     0.13695E+10   12989.      0.14429E+06  0.62864
 HHLAND       16   36.374      11.382      129.55       16.710       55.450      0.31291

  CORRELATION MATRIX OF VARIABLES -       16 OBSERVATIONS


 Y          1.0000
 GRDP     -0.64957E-02   1.0000
 G        -0.20702      0.92080       1.0000
 CARP      0.36987     -0.30180     -0.49653       1.0000
 URATE     0.67191E-01  0.91220      0.84860     -0.30940       1.0000
 POPRATE   0.19278      0.32221      0.66243E-01  0.28889      0.14735       1.0000
 LITRATE   0.12507E-01  0.59616      0.49421      0.11725      0.65952     -0.52874E-01   1.0000
 DIS       0.57685      0.72119      0.47792      0.11891      0.72783      0.35207      0.63648
1.0000
 HHLAND   -0.50398     -0.72371     -0.56143      0.25853E-01 -0.75515     -0.22837     -0.59552
-0.84066
            1.0000
              Y            GRDP         G            CARP         URATE        POPRATE
LITRATE      DIS
              HHLAND

 |_ols Y GRDP G CARP URATE POPRATE LITRATE DIS HHLAND/pcor

 REQUIRED MEMORY IS PAR=       4 CURRENT PAR=    2000
  OLS ESTIMATION
       16 OBSERVATIONS     DEPENDENT VARIABLE= Y
 ...NOTE..SAMPLE RANGE SET TO:      1,     16

  R-SQUARE =   0.8913     R-SQUARE ADJUSTED =   0.7672
 VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.39351E+10
 STANDARD ERROR OF THE ESTIMATE-SIGMA =   62730.
 SUM OF SQUARED ERRORS-SSE=  0.27546E+11
 MEAN OF DEPENDENT VARIABLE =  0.27117E+06
 LOG OF THE LIKELIHOOD FUNCTION = -192.835

 MODEL SELECTION TESTS - SEE JUDGE ET AL. (1985,P.242)
  AKAIKE (1969) FINAL PREDICTION ERROR - FPE =     0.61486E+10
     (FPE IS ALSO KNOWN AS AMEMIYA PREDICTION CRITERION - PC)
  AKAIKE (1973) INFORMATION CRITERION - LOG AIC =   22.392
  SCHWARZ (1978) CRITERION - LOG SC =               22.826
 MODEL SELECTION TESTS - SEE RAMANATHAN (1998,P.165)
  CRAVEN-WAHBA (1979)
     GENERALIZED CROSS VALIDATION - GCV =          0.89945E+10
  HANNAN AND QUINN (1979) CRITERION =              0.54222E+10
  RICE (1984) CRITERION =                         -0.13773E+11
  SHIBATA (1981) CRITERION =                       0.36584E+10
  SCHWARZ (1978) CRITERION - SC =                  0.81894E+10
  AKAIKE (1974) INFORMATION CRITERION - AIC =      0.53029E+10
```

ANALYSIS OF VARIANCE - FROM MEAN

	SS	DF	MS	F
REGRESSION	0.22597E+12	8.	0.28247E+11	7.178
ERROR	0.27546E+11	7.	0.39351E+10	P-VALUE
TOTAL	0.25352E+12	15.	0.16901E+11	0.009

ANALYSIS OF VARIANCE - FROM ZERO

	SS	DF	MS	F
REGRESSION	0.14025E+13	9.	0.15584E+12	39.602
ERROR	0.27546E+11	7.	0.39351E+10	P-VALUE
TOTAL	0.14301E+13	16.	0.89380E+11	0.000

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 7 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
GRDP	-2.2929	1.5771	-1.4538	0.1893	-0.4816	-1.2748	-0.51427
G	8.3817	11.750	0.71330	0.4987	0.2603	0.45811	0.13803
CARP	0.11673	0.14480	0.80617	0.4467	0.2915	0.15715	0.15793
URATE	314.84	15655.	0.20112E-01	0.9845	0.0076	0.73551E-02	0.10115E-01
POPRATE	-7399.9	57234.	-0.12929	0.9008	-0.0488	-0.30935E-01	-0.60137E-01
LITRATE	-9770.9	4174.3	-2.3407	0.0518	-0.6626	-0.52633	-2.9267
DIS	4.1673	1.1785	3.5361	0.0095	0.8007	1.1863	0.90466
HHLAND	-5610.2	2860.5	-1.9613	0.0907	-0.5955	-0.49117	-0.75253
CONSTANT	0.10963E+07	0.39933E+06	2.7454	0.0287	0.7201	0.0000	4.0429

CORRELATION MATRIX OF COEFFICIENTS

	GRDP	G	CARP	URATE	POPRATE	LITRATE	DIS	HHLAND	CONSTANT
GRDP	1.0000								
G	-0.90343	1.0000							
CARP	0.15984	0.12644E-01	1.0000						
URATE	-0.23928	-0.45793E-01	0.18722	1.0000					
POPRATE	-0.74838	0.62911	-0.38863	0.12407	1.0000				
LITRATE	-0.32432	0.23498	-0.50498	-0.20858	0.54295	1.0000			
DIS	-0.54004	0.56386	-0.19647	-0.13909	0.23547	0.79035E-02	1.0000		
HHLAND	0.21359E-01	-0.23983E-02	0.33516E-01	0.18565	-0.72327E-01	-0.41297E-01	0.47566	1.0000	
CONSTANT	0.53898	-0.39599	0.33989	-0.18926	-0.69250	-0.82574	-0.24949	-0.35797	1.0000

DURBIN-WATSON = 1.8373   VON NEUMANN RATIO = 1.9598   RHO = 0.07677
RESIDUAL SUM = 0.60390E-09 RESIDUAL VARIANCE = 0.39351E+10
SUM OF ABSOLUTE ERRORS= 0.47359E+06
R-SQUARE BETWEEN OBSERVED AND PREDICTED = 0.8913
RUNS TEST: 8 RUNS,   8 POS,   0 ZERO,   8 NEG NORMAL STATISTIC = -0.5175
COEFFICIENT OF SKEWNESS =   0.0520 WITH STANDARD DEVIATION OF 0.5643
COEFFICIENT OF EXCESS KURTOSIS =   1.6365 WITH STANDARD DEVIATION OF 1.0908

JARQUE-BERA NORMALITY TEST- CHI-SQUARE(2 DF)=   0.4488 P-VALUE= 0.799

GOODNESS OF FIT TEST FOR NORMALITY OF RESIDUALS - 12 GROUPS

OBSERVED	0.0	0.0	1.0	0.0	2.0	5.0	5.0	2.0	0.0	1.0	0.0	0.0
EXPECTED	0.1	0.3	0.7	1.5	2.4	3.1	3.1	2.4	1.5	0.7	0.3	0.1

CHI-SQUARE =   6.4972 WITH 1 DEGREES OF FREEDOM, P-VALUE= 0.011

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|_ols Y GRDP CARP POPRATE LITRATE DIS HHLAND/pcor

REQUIRED MEMORY IS PAR=       4 CURRENT PAR=    2000
 OLS ESTIMATION
       16 OBSERVATIONS     DEPENDENT VARIABLE= Y
...NOTE..SAMPLE RANGE SET TO:      1,     16

 R-SQUARE =   0.8834     R-SQUARE ADJUSTED =   0.8057
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.32843E+10
STANDARD ERROR OF THE ESTIMATE-SIGMA =   57309.
SUM OF SQUARED ERRORS-SSE=  0.29559E+11
MEAN OF DEPENDENT VARIABLE =  0.27117E+06
LOG OF THE LIKELIHOOD FUNCTION = -193.399

MODEL SELECTION TESTS - SEE JUDGE ET AL. (1985,P.242)
 AKAIKE (1969) FINAL PREDICTION ERROR - FPE =     0.47212E+10
    (FPE IS ALSO KNOWN AS AMEMIYA PREDICTION CRITERION - PC)
 AKAIKE (1973) INFORMATION CRITERION - LOG AIC =   22.212
 SCHWARZ (1978) CRITERION - LOG SC =               22.550
MODEL SELECTION TESTS - SEE RAMANATHAN (1998,P.165)
 CRAVEN-WAHBA (1979)
    GENERALIZED CROSS VALIDATION - GCV =          0.58388E+10
 HANNAN AND QUINN (1979) CRITERION =              0.45091E+10
 RICE (1984) CRITERION =                          0.14779E+11
 SHIBATA (1981) CRITERION =                       0.34639E+10
 SCHWARZ (1978) CRITERION - SC =                  0.62140E+10
 AKAIKE (1974) INFORMATION CRITERION - AIC =      0.44317E+10

                     ANALYSIS OF VARIANCE - FROM MEAN
                      SS          DF            MS                 F
REGRESSION       0.22396E+12      6.       0.37327E+11           11.365
ERROR            0.29559E+11      9.       0.32843E+10          P-VALUE
TOTAL            0.25352E+12     15.       0.16901E+11            0.001

                     ANALYSIS OF VARIANCE - FROM ZERO
                      SS          DF            MS                 F
REGRESSION       0.14005E+13      7.       0.20007E+12           60.918
ERROR            0.29559E+11      9.       0.32843E+10          P-VALUE
TOTAL            0.14301E+13     16.       0.89380E+11            0.000


VARIABLE    ESTIMATED   STANDARD   T-RATIO          PARTIAL STANDARDIZED ELASTICITY
  NAME     COEFFICIENT    ERROR       9 DF    P-VALUE CORR.  COEFFICIENT  AT MEANS

GRDP      -1.2531     0.46664      -2.6855     0.0250-0.6670 -0.69674     -0.28107
CARP      0.11399     0.12992      0.87741     0.4031 0.2807  0.15346      0.15421
POPRATE   -33546.      39849.     -0.84184     0.4217-0.2702 -0.14024     -0.27262
LITRATE   -10427.      3629.1      -2.8732     0.0184-0.6917 -0.56167      -3.1232
DIS        3.7004     0.88076       4.2013     0.0023 0.8138   1.0533      0.80330
HHLAND    -5633.4      2567.8      -2.1938     0.0559-0.5903 -0.49320     -0.75564
CONSTANT  0.12135E+07 0.32632E+06   3.7187     0.0048 0.7783   0.0000       4.4750

CORRELATION MATRIX OF COEFFICIENTS
GRDP       1.0000
CARP      0.70450       1.0000
POPRATE  -0.55518     -0.56831       1.0000
LITRATE  -0.54402     -0.50368      0.58661       1.0000
DIS      -0.23584     -0.22690     -0.16347     -0.18889       1.0000
HHLAND    0.22428     -0.14207E-02 -0.13253     -0.42281E-02  0.61964       1.0000
CONSTANT  0.42424      0.43705     -0.60381     -0.90908     -0.67977E-01 -0.36450       1.0000
             GRDP          CARP         POPRATE      LITRATE      DIS          HHLAND    CONSTANT

DURBIN-WATSON = 2.0256    VON NEUMANN RATIO = 2.1606    RHO = -0.01701
RESIDUAL SUM = -0.14625E-08  RESIDUAL VARIANCE =  0.32843E+10
SUM OF ABSOLUTE ERRORS=  0.46950E+06
R-SQUARE BETWEEN OBSERVED AND PREDICTED = 0.8834
RUNS TEST:    8 RUNS,    7 POS,    0 ZERO,    9 NEG  NORMAL STATISTIC = -0.4606
COEFFICIENT OF SKEWNESS =   0.6800 WITH STANDARD DEVIATION OF 0.5643
COEFFICIENT OF EXCESS KURTOSIS =   3.2147 WITH STANDARD DEVIATION OF 1.0908

JARQUE-BERA NORMALITY TEST- CHI-SQUARE(2 DF)=    3.5198 P-VALUE= 0.172
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     GOODNESS OF FIT TEST FOR NORMALITY OF RESIDUALS - 10 GROUPS
OBSERVED  0.0  0.0  1.0  1.0  7.0  5.0  1.0  0.0  1.0  0.0
EXPECTED  0.1  0.4  1.3  2.5  3.6  3.6  2.5  1.3  0.4  0.1
CHI-SQUARE =    8.3224 WITH  1 DEGREES OF FREEDOM, P-VALUE= 0.004


|_diagnos/ het

REQUIRED MEMORY IS PAR=       7 CURRENT PAR=    2000
DEPENDENT VARIABLE = Y               16 OBSERVATIONS
REGRESSION COEFFICIENTS
  -1.25314284453      0.113989858880      -33546.4467886      -10426.8663577
   3.70036028737     -5633.36624733       1213500.54421

HETEROSKEDASTICITY TESTS
                            CHI-SQUARE     D.F.   P-VALUE
                          TEST STATISTIC
E**2 ON YHAT:                      2.568     1    0.10903
E**2 ON YHAT**2:                   2.270     1    0.13193
E**2 ON LOG(YHAT**2):              2.330     1    0.12689
E**2 ON LAG(E**2) ARCH TEST:       0.608     1    0.43564
LOG(E**2) ON X (HARVEY) TEST:      4.320     6    0.63341
ABS(E) ON X (GLEJSER) TEST:        7.665     6    0.26366
E**2 ON X                 TEST:
          KOENKER(R2):             5.716     6    0.45575
          B-P-G (SSR) :           11.265     6    0.08054

E**2 ON X X**2    (WHITE) TEST:
          KOENKER(R2):            15.344    12    0.22316
          B-P-G (SSR) :           30.239    12    0.00257
...MATRIX IS NOT POSITIVE DEFINITE..FAILED IN ROW   15

E**2 ON X X**2 XX (WHITE) TEST:
          KOENKER(R2):        **********    27  *********
          B-P-G (SSR) :       **********    27  *********


|_ols Y GRDP CARP POPRATE LITRATE DIS HHLAND/dwpvalue

REQUIRED MEMORY IS PAR=       6 CURRENT PAR=    2000
 OLS ESTIMATION
       16 OBSERVATIONS     DEPENDENT VARIABLE= Y
...NOTE..SAMPLE RANGE SET TO:      1,     16

DURBIN-WATSON STATISTIC  =   2.02556
DURBIN-WATSON POSITIVE AUTOCORRELATION TEST P-VALUE =    0.280343
              NEGATIVE AUTOCORRELATION TEST P-VALUE =    0.719657

 R-SQUARE =   0.8834     R-SQUARE ADJUSTED =   0.8057
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.32843E+10
STANDARD ERROR OF THE ESTIMATE-SIGMA =   57309.
SUM OF SQUARED ERRORS-SSE=  0.29559E+11
MEAN OF DEPENDENT VARIABLE =  0.27117E+06
LOG OF THE LIKELIHOOD FUNCTION = -193.399

MODEL SELECTION TESTS - SEE JUDGE ET AL. (1985,P.242)
 AKAIKE (1969) FINAL PREDICTION ERROR - FPE =     0.47212E+10
    (FPE IS ALSO KNOWN AS AMEMIYA PREDICTION CRITERION - PC)
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MODEL SELECTION TESTS - SEE RAMANATHAN (1998,P.165)
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    GENERALIZED CROSS VALIDATION - GCV =          0.58388E+10
 HANNAN AND QUINN (1979) CRITERION =              0.45091E+10
 RICE (1984) CRITERION =                          0.14779E+11
 SHIBATA (1981) CRITERION =                       0.34639E+10
 SCHWARZ (1978) CRITERION - SC =                  0.62140E+10
 AKAIKE (1974) INFORMATION CRITERION - AIC =      0.44317E+10
```

ANALYSIS OF VARIANCE - FROM MEAN

	SS	DF	MS	F
REGRESSION	0.22396E+12	6.	0.37327E+11	11.365
ERROR	0.29559E+11	9.	0.32843E+10	P-VALUE
TOTAL	0.25352E+12	15.	0.16901E+11	0.001

ANALYSIS OF VARIANCE - FROM ZERO

	SS	DF	MS	F
REGRESSION	0.14005E+13	7.	0.20007E+12	60.918
ERROR	0.29559E+11	9.	0.32843E+10	P-VALUE
TOTAL	0.14301E+13	16.	0.89380E+11	0.000

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 9 DF	P-VALUE	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
GRDP	-1.2531	0.46664	-2.6855	0.0250	-0.6670	-0.69674	-0.28107
CARP	0.11399	0.12992	0.87741	0.4031	0.2807	0.15346	0.15421
POPRATE	-33546.	39849.	-0.84184	0.4217	-0.2702	-0.14024	-0.27262
LITRATE	-10427.	3629.1	-2.8732	0.0184	-0.6917	-0.56167	-3.1232
DIS	3.7004	0.88076	4.2013	0.0023	0.8138	1.0533	0.80330
HHLAND	-5633.4	2567.8	-2.1938	0.0559	-0.5903	-0.49320	-0.75564
CONSTANT	0.12135E+07	0.32632E+06	3.7187	0.0048	0.7783	0.0000	4.4750

```
DURBIN-WATSON = 2.0256    VON NEUMANN RATIO = 2.1606    RHO = -0.01701
RESIDUAL SUM =  0.70941E-10  RESIDUAL VARIANCE =  0.32843E+10
SUM OF ABSOLUTE ERRORS=  0.46950E+06
R-SQUARE BETWEEN OBSERVED AND PREDICTED = 0.8834
RUNS TEST:    8 RUNS,    7 POS,    0 ZERO,    9 NEG  NORMAL STATISTIC = -0.4606
COEFFICIENT OF SKEWNESS =   0.6800 WITH STANDARD DEVIATION OF 0.5643
COEFFICIENT OF EXCESS KURTOSIS =   3.2147 WITH STANDARD DEVIATION OF 1.0908

JARQUE-BERA NORMALITY TEST- CHI-SQUARE(2 DF)=    3.5198 P-VALUE= 0.172

     GOODNESS OF FIT TEST FOR NORMALITY OF RESIDUALS - 10 GROUPS
OBSERVED  0.0  0.0  1.0  1.0  7.0  5.0  1.0  0.0  1.0  0.0
EXPECTED  0.1  0.4  1.3  2.5  3.6  3.6  2.5  1.3  0.4  0.1
CHI-SQUARE =    8.3224 WITH  1 DEGREES OF FREEDOM, P-VALUE= 0.004
|_stop
TYPE COMMAND
```